

CLAIMS

What is claimed:

1. A thermal interface material for thermal coupling of an electronic component to a thermally conductive member, comprising:
 - a viscoelastic polymer matrix material; and
 - fusible solder particles in the matrix material, having a melting temperature below a selected temperature.
2. The thermal interface material of claim 1 wherein the matrix material comprises between 1 and 20% by weight.
3. The thermal interface material of claim 2 wherein the matrix material comprises approximately 8% by weight.
4. The thermal interface material of claim 1 wherein the matrix material is selected from the group consisting of a silicone, an amino epoxy, and acrylate, an olefin resin, a low-viscosity vinyl and a phase-change material.
5. The thermal interface material of claim 4 wherein the matrix material is

silicone.

6. The thermal interface material of claim 5 wherein the solder particles comprise between 1 and 99% by weight.
7. The thermal interface material of claim 6 wherein the solder particles comprise at least 5% by weight.
8. The thermal interface material of claim 7 wherein the solder particles comprise between 25 and 90% by weight.
9. The thermal interface material of claim 1 wherein the solder particles are selected from the group consisting of In, InSn, InAg, SnAg, SnAgCu, SnBi, InSnBi, InTi, InZr, InTiCeSe, and InAgTiSeCe.
10. The thermal interface material of claim 1 wherein the matrix material is silicone and the solder particles do not substantially attack the silicone when the solder particles melt.
11. The thermal interface material of claim 1 wherein the solder particles have a melting temperature between 60 and 300°C.

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12. The thermal interface material of claim 11 wherein the solder particles have a melting temperature of approximately 157°C.
 13. The thermal interface material of claim 1 wherein the solder particles have widths of between 0.2 and 100 microns.
 14. The thermal interface material of claim 1, further comprising:
filler particles in the matrix material having a melting temperature above the selected temperature.
 15. The thermal interface material of claim 14 wherein the filler particles comprise between 1 and 95% of the thermal interface material by weight.
 16. The thermal interface material of claim 15 wherein the filler particles comprise at least 10% by weight.
 17. The thermal interface material of claim 16 wherein the filler particles comprise approximately 15% by weight.
 18. The thermal interface material of claim 16 wherein the solder particles and

- the filler particles comprise between 50 and 95% by weight.
19. The thermal interface material of claim 18 wherein the solder particles and the filler particles comprise approximately 92% by weight.
20. The thermal interface material of claim 16 wherein the filler particles are selected from the group consisting of Ni, Cu, Ag, Ag/Cu, Sn, graphite and Al.
21. The thermal interface material of claim 20 wherein the filler particles are Al.
22. The thermal interface material of claim 16 wherein the filler particles have a melting temperature above 350°C.
23. The thermal interface material of claim 16 wherein the filler particles have a melting temperature which is at least 100°C above a melting temperature of the solder particles.
24. The thermal interface material of claim 16 wherein the filler particles have a melting temperature which is at least 200°C above a melting temperature of the solder particles.

25. A thermal interface material for thermal coupling of an electronic component to a thermally conductive member, comprising:
 - a viscoelastic polymer matrix material;
 - fusible solder particles in the matrix material, having a melting temperature below 200°C and do not substantially attack the matrix material when the solder particles are melted; and
 - filler particles in the matrix material, having a melting temperature above 400°C.
26. The thermal interface material of claim 25 wherein the matrix material is silicone.
27. The thermal interface material of claim 26 wherein the filler particles are aluminum.
28. An electronic assembly comprising:
 - an electronic component which generates heat when operated;
 - a thermally conductive member spaced from the electronic component;and
 - a thermal interface material between the electronic component and the

thermally conductive member, the thermal interface material including a viscoelastic polymer matrix material, solder particles that are fused together so as to provide an unbroken thermal path for heat to conduct from the electronic component and the thermally conductive member and having a melting temperature below a selected temperature, and filler particles in the matrix material having a melting temperature above the selected temperature.

29. The electronic assembly of claim 28 wherein the filler particles have a melting temperature which is at least 100°C above a melting temperature of the solder particles.
30. The electronic assembly of claim 29 wherein at least one of the filler particles is in contact with and entirely surrounded by one of the solder particles.